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THE EFFECT OF TOPICALLY APPLIED SODIUM FLUORIDE ON DENTAL CARIES EXPERIENCE^{1,2}

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INTRODUCTION

The results of numerous investigations into the relationship between fluorine and dental disease led to the hypothesis that the incidence of dental caries could be reduced by topical applications of a fluoride solution to the teeth. Since there is an extensive literature on the subject of fluorine and dental caries, only the five major links in the chain of evidence which engendered and supported this hypothesis will be enumerated here: First, Armstrong and Brekhus (1) demonstrated that intact enamel of carious teeth contains less fluorine than enamel of noncarious teeth. Second, the epidemiological studies of Dean and his collaborators (2, 3, 4, 5) showed that the presence of approximately one part per million of fluoride in domestic water supplies is associated with a decreased prevalence of dental caries. Third, the results of animal experimentation demonstrated that the incidence of dental caries in the teeth of rats was reduced by the addition of extra fluorine to the diet (6, 7, 8, 9). Fourth, Volker, Hodge, Wilson, and Van Voorhis (10) discovered that fluorine is absorbed from solution by powdered enamel in accordance with the requirements of the Freundlich adsorption isotherm. Fifth, the fluorine

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content of the enamel of mature erupted rat molars is increased by giving drinking water containing 20 p. p. m. of fluoride and apparently the increase is brought about by direct adsorption (11).

Two preliminary reports made in 1942 presented the results of investigations into the effect of topical applications of fluoride to the teeth. Bibby (12) reported that during the year following the institution of treatment, 95 new carious surfaces occurred in the permanent teeth of the treated quadrants and 135 new carious surfaces occurred in the permanent teeth of the untreated mouth quadrants of 89 children aged 10 to 13 years. Treatment consisted of topical applications of a 0.1 percent solution of sodium fluoride to the teeth at intervals of 4 months. In reporting on a 3- to 3.5-month period of caries experience in the deciduous teeth of 27 treated children and 19 control children aged 4½ to 6 years, Cheyne (13) concluded that the treatment effected a 50-percent reduction in caries incidence and had a pronounced tendency to arrest lesions which were actively carious at the time of treatment. Treatment consisted of two complete applications of a 0.05 percent potassium fluoride solution to the teeth of the treated group. Recently Bibby (14) reported that the order of differences noted in the first preliminary report on his study group had decreased slightly 2 years after treatment was initiated. Although these pieces of direct evidence are not conclusive, they are in accord with the original hypothesis.

It is the purpose of this paper to present data on the incidence of dental caries during the year ended May 1943, in the permanent teeth of two groups of children. The first of these, a treated group consisting of 289 children, received topical applications of 2-percent sodium fluoride solution to the teeth in the upper left and lower left quadrants of the mouth. The second, a control group consisting of 326 children, did not receive the fluoride treatments. Briefly, the analysis of the data indicates:

1. In the treated group there were 39.8 percent less new carious teeth in the treated than in untreated teeth.
2. The difference between the caries incidence in the treated and untreated teeth was appreciably greater in the upper than in the lower teeth.
3. The number of new carious surfaces in teeth previously attacked by caries was not significantly different in the treated and untreated teeth.
4. The incidence of caries in the teeth of the right or untreated mouth quadrants of the treated group was not significantly different from that in the teeth of the right (or the left) quadrants of the control group.

MATERIAL AND METHODS

In March 1942, parental permission was obtained in three small urban centers in Minnesota to make topical application of fluoride to the teeth of 337 children aged 7 to 15 years. Of this group of children, 126 attended the public grade school in North Mankato,

114 attended either the public or parochial school in Arlington, and 97 attended junior high school in St. Louis Park.

Prior to the institution of treatment, each child in the treated group received a dental prophylaxis treatment consisting of scaling and polishing of the teeth and a detailed dental examination. The examinations were made with mouth mirror and explorer under artificial light and with compressed air available for use at the examiner's discretion. Only the teeth in the upper left and lower left quadrants of the mouth were treated. The treatment consisted of isolation of the teeth with cotton rolls, drying the teeth with compressed air, and wetting the crown surfaces of the teeth with 2-percent sodium fluoride solution. The applied solution was allowed to dry in air for approximately 4 minutes. After the cotton rolls had been removed, the child was instructed to expectorate and he was then dismissed.

During an 8-week period in April and May 1942, the North Mankato and Arlington children in the treated group were given two treatments weekly to a maximum of 15 and a minimum of 8 treatments. The St. Louis Park children were given one treatment weekly to a maximum of 8 and a minimum of 7 treatments. The number of treatments given each child was determined largely on the basis of the maximum number of treatments that could be administered conveniently during the 8-week period remaining in the school year. This study was not designed to determine the minimum number of effective treatments but to assess the worth of relatively frequent exposures of the teeth to soluble fluorides administered over a relatively short period of time.

Children enrolled in the same schools as the treated group but not participating in the treatment program were utilized as a control group. The 392 children in this group were given dental prophylaxis treatment and dental examination similar to that given the children in the treated group.

Approximately 1 year after the fluoride treatments had been administered, the teeth of the children in both the treated and control groups were reexamined. The second examinations were made by the same person and with the same equipment as the first. Of the 337 children originally in the treated group, 289 were reexamined; of the 392 children originally in the control group, 326 were reexamined. Thus 14.2 percent of the treated group and 16.8 percent of the control group were not reexamined. Most of the children not available for the second examination had changed residence or were not attending school at the time the reexaminations were conducted. A few were absent from school.

Only the data pertaining to the children who were given a second examination are presented here. The analysis is confined to the

dental caries experience in the erupted permanent teeth present at the time of the first examinations. The term *new caries* is used in this presentation to designate teeth or tooth surfaces which were non-carious in April 1942 and became carious (decayed or filled) during the year ended May 1943. A total of 14 teeth, 6 from the left and 8 from the right mouth quadrants, were extracted from children in the treated group during the study year. Since the new caries experience in these teeth prior to extraction is not known, they are omitted from the tabulations. The age classification refers to the age at the time of the first examination.

FINDINGS

Results obtained from a comparison of the incidence of new carious teeth in the treated and untreated mouth quadrants of each child in the treated group are summarized in table 1. Because of the bilaterally equal occurrence of dental caries in the teeth of population groups, it is reasonable to expect that the number of instances in which individuals have more caries in the left than in the right quadrants of the jaw would be equal to the number of instances in which the opposite obtains. From an inspection of the data in table 1, it will be noted that for the upper quadrants 63 children had fewer new carious teeth in the treated than in the untreated quadrant, whereas the relationship was in the reverse order in only 26 children. For the lower jaw, 48 children had fewer and 30 children had more new carious teeth in the treated than untreated quadrant.

TABLE 1.—*The incidence of caries in permanent teeth previously free of caries. A comparison of fluorine-treated and untreated quadrants in each jaw of 289 treated children*

	Upper jaw	Lower jaw
	<i>Persons</i>	<i>Persons</i>
Lower incidence in treated quadrant.....	63	48
Higher incidence in treated quadrant.....	26	30
Incidence equal (one or more) in treated and untreated quadrant.....	15	12
No new carious teeth in either treated or untreated quadrant.....	185	199
Total number of children.....	289	289

A complete test of the statistical significance of the difference between the observed distribution of caries experience by mouth quadrants as given in table 1 and a theoretical distribution based on bilaterally equal occurrence of dental caries is possible provided the detailed data on dental caries in the individual teeth of each quadrant are available. However, a conservative estimate can be obtained readily by limiting the comparison to the instances in which there were less new carious teeth in the treated than in the untreated quadrants and the instances in which the reverse result was observed. On the

assumption that these two events should occur with equal frequency, the probability that the observed difference would occur by chance is 0.0001 for the upper quadrants and 0.0417 for the lower quadrants.

The number of permanent teeth without evidence of past or present caries at the time of the first examination in 1942, and the number of these that were attacked by caries during the year ended May 1943, are presented for the treated group in table 2. In addition, the number of carious tooth surfaces in newly attacked teeth and the number of new carious surfaces in previously attacked teeth are also given.

It will be noted from the totals for all ages in table 2 that 54 teeth became carious in the upper left or treated quadrant and 100 in the upper right or untreated quadrant. This represents a difference of 46.0 percent less new carious teeth in the treated than in the untreated upper teeth. On the basis of percentage of teeth attacked, the rate is 5.3 for the treated and 9.7 for the untreated teeth. The probability that this or a greater difference might occur by chance is 0.0002.

In the lower jaw, 46 new carious teeth occurred in the left and 66 in the right quadrant. This is a difference of 30.3 percent less carious teeth in the treated than in the untreated teeth. The percentage of teeth attacked is 3.7 for the treated and 5.3 for the untreated lower teeth. The probability that this or a greater difference might occur by chance is 0.0574. Although this difference is not statistically significant, the fact that in eight of the nine age groups fewer teeth became carious in the treated than in the untreated quadrant and the fact that the difference is in accord with the findings in the upper teeth strongly suggest that the observed difference is real but that the available experience is insufficient to be conclusive.

The total number of new carious teeth in both treated quadrants is 100 and that for both untreated quadrants is 166. This is a gross difference of 39.8 percent less teeth attacked by caries in the treated than in the untreated teeth. In terms of percentage caries attack rates for the previously noncarious teeth, 4.4 percent of the treated and 7.3 percent of the untreated became carious during the study year.

Since the number of tooth surfaces attacked by caries is highly correlated with the number of teeth attacked, it is to be expected that the difference in the number of new carious tooth surfaces occurring in the teeth of the treated and untreated quadrants of the mouth would be similar to the differences indicated in terms of numbers of teeth attacked. The direction of the difference is the same—112 and 166 new carious tooth surfaces in the treated and untreated upper quadrants, respectively, and 120 and 147 in the treated and untreated lower quadrants, respectively. In the upper quadrants, there were 32.5 percent less and in the lower quadrants there were 18.4 percent

TABLE 2.—Treated group, dental caries experience during the year ended May 1943, for the permanent teeth in the treated and untreated quadrants of the jaws of 289 Minnesota children

Age	Urban center	Num-ber of chil-dren	Treated						Untreated										
			Upper left			Upper right			Lower left			Lower right							
			New DF teeth ¹	DF sur-faces in new teeth ²	Total new DF sur-faces in sur-faces ³	New DF teeth ¹	DF sur-faces in new teeth ²	Total new DF sur-faces in sur-faces ³	New DF teeth ¹	DF sur-faces in new teeth ²	Total new DF sur-faces in sur-faces ³	New DF teeth ¹	DF sur-faces in new teeth ²	Total new DF sur-faces in sur-faces ³					
7	North Mankato	10	15	0	0	0	16	0	0	0	21	1	1	3	4	21	2	2	4
8	North Mankato	18	30	4	1	5	35	5	1	6	37	1	1	2	3	40	2	3	3
9	North Mankato	26	73	4	5	3	80	9	3	12	84	2	3	5	8	83	4	4	7
10	North Mankato	22	52	4	4	4	62	10	11	6	17	80	1	1	5	6	77	4	4
10	Arlington	19	54	2	2	1	51	3	3	3	66	3	4	4	8	71	2	3	6
10	Total	41	106	6	6	5	113	13	14	6	20	146	4	5	9	14	143	6	7
11	North Mankato	21	75	3	3	3	77	4	4	3	7	89	3	4	1	5	94	4	5
11	Arlington	18	63	4	0	4	63	4	4	8	85	4	6	4	10	83	4	4	6
11	Total	39	138	7	7	3	140	8	8	7	15	174	7	10	5	15	177	8	11
12	North Mankato	9	41	1	1	0	41	2	2	4	46	0	0	0	0	48	1	1	2
12	Arlington	26	116	5	7	8	133	13	16	2	18	127	3	4	6	131	15	15	6
12	St. Louis Park	10	60	3	3	2	57	2	2	3	5	80	4	4	8	70	2	3	7
12	Total	51	217	9	11	10	210	17	20	7	27	263	7	8	10	18	249	18	11
13	Arlington	16	78	2	4	6	82	10	10	3	13	81	3	3	5	8	78	3	3
13	St. Louis Park	29	120	8	4	4	124	17	20	5	25	150	10	11	8	19	158	12	10
13	Total	44	198	10	12	10	206	27	30	8	38	231	13	14	13	27	236	15	17
14	Arlington	19	81	6	7	8	91	8	8	4	12	98	3	3	0	3	95	5	4
14	St. Louis Park	31	114	6	8	7	135	11	12	18	30	142	6	8	16	24	149	6	10
14	Total	50	195	12	15	15	230	19	20	22	42	240	9	11	16	27	244	11	14

15	Arlington.....	3	16	1	2	0	2	15	0	1	1	16	1	0	1	10	0	0	2
15	St. Louis Park.....	7	22	1	1	2	3	25	2	3	2	5	34	1	3	32	0	0	3
15	Total.....	10	38	2	3	2	5	40	2	3	3	50	2	3	4	48	0	0	5
	Total all ages.....	289	1,010	54	63	49	112	1,026	100	109	57	166	46	64	120	1,246	66	75	147

1 Number of noncarious teeth present at the time of the first examination, April 1942.

2 Number of noncarious teeth that became carious during the year ended May 1943.

3 Number of surfaces attacked by caries in new carious teeth.

4 Number of new carious surfaces in teeth that had one or more carious surfaces at the time of the first examination.

5 The sum of the items in 3 and 4.

less new carious tooth surfaces in the treated than in the untreated teeth. For all teeth, the gross difference between the number of new carious tooth surfaces in treated and untreated teeth is 25.9 percent. However, the order of this difference is appreciably less than when the comparison was made on the basis of teeth instead of tooth surfaces. An explanation for this finding can be obtained from a comparison of the number of new carious tooth surfaces in previously attacked teeth. It will be noted that although the totals are less for the treated than the untreated—49 in the treated and 57 in the untreated upper teeth, and 64 in the treated and 72 in the untreated lower teeth—the differences are relatively slight. Furthermore, when the comparison is made for each age group, it will be found that the number of instances in which the new carious tooth surfaces are fewer in the treated than in the untreated previously attacked teeth is markedly similar to the number of instances in which the opposite result is obtained. The conclusion follows that either the treatment is not effective in preventing caries attack on surfaces of previously attacked teeth or the order of its effectiveness is not great enough to be determined from these data.

The foregoing analysis of findings in the treated groups has been made without differentiation according to number of treatments given. The distribution of the children with respect to the number of treatments received is presented in table 3.

TABLE 3.—*Number of children in the treated group according to number of topical applications of sodium fluoride solution to the teeth in the left quadrants of the mouth, and according to school attended*

School	Number of treatments									Total
	7	8	9	10	11	12	13	14	15	
North Mankato.....					1	1	4	15	85	106
Arlington.....		1				4	12	13	70	100
St. Louis Park.....	5	78								83
All schools....	5	79			1	5	16	28	155	289

Since all but 51 of the North Mankato and Arlington children received the maximum number of 15 treatments and all but 5 of the St. Louis Park children received the maximum number of 8 treatments, a comparison of the findings within these two groups with respect to number of treatments is not indicated. However, a comparison of the caries experience in the St. Louis Park children with that in the North Mankato and Arlington children is warranted. An examination of the data on the age specific caries experience presented in table 2 gives no indication that the North Mankato and Arlington children who received roughly twice as many treatments as the St. Louis Park children were benefited by the additional treatments.

During administration of the treatment, complete wetting of the crown surfaces of the central incisors was not obtained in most instances without wetting the mesial surface of the central incisors in the untreated quadrants. The effect of this partial wetting is not known. However, 9 central incisors in the treated quadrants and 13 in the untreated quadrants were attacked by caries. Since the difference in caries experience in the left and right central incisors was similar to that for all teeth in the treated and untreated quadrants, the general results of the analysis would not be influenced by removing these teeth from consideration.

It is not unlikely that topical applications of fluoride to the teeth in two quadrants of the mouth might have a general effect on the environment and caries experience of the teeth in the untreated quadrants. In order to measure this effect, a negative control group of children was studied concurrently with the treated group. The only means of determining the comparability of the expected new caries experience in these two groups of children for the year ended May 1943 is to ascertain the similarity or dissimilarity in their past caries experience. Data on the prevalence of dental caries in the treated and control groups of children at the time of the first examinations are presented in table 4.

TABLE 4.—*The number, and the average number of decayed, missing, or filled (DMF) permanent teeth per child for 289 treated children and 326 control children, by age, April 1942*

	Age								
	7	8	9	10	11	12	13	14	15
	Number of DMF teeth								
Treated group.....	18	42	75	178	232	340	309	517	104
Control group.....	14	22	47	81	86	300	459	784	487
	Average number of DMF teeth per child								
Treated group.....	1.80	2.33	2.88	4.34	5.95	6.67	7.02	10.34	10.40
Control group.....	1.08	2.20	2.76	4.50	5.73	6.98	7.06	8.34	9.55

The age specific prevalence of dental caries in the treated group and that in the control group (table 4) are quite similar. The numerical average of the nine age specific rates for the treated and for the control group are 5.75 and 5.36, respectively. Because of this similarity, it seems reasonable to expect that for the year following the first examination the incidence of dental caries in the treated group would normally be approximately the same as that in the control group.

Data on the incidence of dental caries in the control group are presented in table 5. From the totals for all ages, it will be noted

TABLE 5.—Control group. Dental caries experience during year ended May 1943, in the permanent teeth of 323 Minnesota children

Age	Urban center	Num-ber of chil-dren	Upper left				Upper right				Lower left				Lower right								
			P teeth ¹	New DF sur-faces in new DF teeth ²	DF sur-faces in new DF teeth ³	Total DF sur-faces ⁴	P teeth ¹	New DF sur-faces in new DF teeth ²	DF sur-faces in new DF teeth ³	Total DF sur-faces ⁴	P teeth ¹	New DF sur-faces in new DF teeth ²	DF sur-faces in new DF teeth ³	Total DF sur-faces ⁴	P teeth ¹	New DF sur-faces in new DF teeth ²	DF sur-faces in new DF teeth ³	Total DF sur-faces ⁴					
7	North Mankato.....	13	23	5	5	0	5	21	2	2	0	2	2	25	1	2	1	3	27	1	1	2	3
8	North Mankato.....	10	22	0	0	1	1	21	1	1	2	3	28	1	1	1	2	24	1	1	2	3	
9	North Mankato.....	7	19	3	3	2	5	16	1	1	0	1	21	0	0	0	0	19	1	1	0	3	
9	Arlington.....	10	24	1	1	2	3	22	0	0	1	26	1	26	1	0	1	30	1	1	2	3	
9	Total.....	17	43	4	4	4	8	38	1	1	1	2	47	1	0	1	49	2	3	3	6		
10	North Mankato.....	6	16	1	1	2	3	20	2	2	1	3	29	1	1	0	1	24	2	2	3	5	
10	Arlington.....	12	36	11	13	3	16	34	10	11	4	15	34	2	2	1	3	35	1	1	7	8	
10	Total.....	18	52	12	14	5	19	54	12	13	5	18	63	3	3	1	4	59	3	4	9	13	
11	North Mankato.....	11	27	0	0	6	6	30	3	3	2	5	46	0	0	1	1	49	1	1	2	6	
11	Arlington.....	4	20	1	1	0	1	19	0	0	0	20	0	20	0	0	1	19	1	1	1	2	
11	Total.....	15	47	1	1	6	7	49	3	3	2	5	66	0	0	2	2	68	2	3	5	8	
12	North Mankato.....	5	24	2	2	0	2	24	1	1	0	1	23	0	0	3	3	24	2	2	3	5	
12	Arlington.....	3	26	0	0	3	3	25	3	3	0	3	27	1	1	1	3	28	3	3	3	6	
12	St. Louis Park.....	33	155	18	21	6	27	153	16	18	3	21	177	10	11	8	19	175	9	11	7	18	
12	Total.....	43	205	20	23	9	32	202	20	22	3	25	226	11	13	12	25	227	14	17	12	29	
13	Arlington.....	6	34	3	4	3	7	33	5	6	1	7	35	4	5	1	6	33	0	0	4	4	
13	St. Louis Park.....	59	283	30	34	30	64	263	38	45	21	66	293	18	23	26	49	286	16	17	25	43	
13	Total.....	65	297	33	38	33	71	296	43	51	22	73	328	22	28	27	55	329	16	17	29	46	
14	Arlington.....	12	57	3	4	1	5	59	5	7	6	13	67	1	1	3	4	64	4	5	4	9	
14	St. Louis Park.....	82	364	31	38	33	71	364	35	39	46	85	404	22	25	28	53	430	28	34	24	58	
14	Total.....	94	421	34	42	34	76	423	40	46	62	98	471	23	26	31	57	484	32	39	28	67	

16	Arlington.....	20	91	10	10	5	16	86	4	3	5	8	98	4	5	9	14	96	6	7	11
16	St. Louis Park.....	31	131	11	17	28	128	12	12	16	22	38	146	7	30	5	15	146	5	8	17
16	Total.....	51	222	21	23	43	214	16	16	19	27	46	244	11	15	14	29	242	11	15	21
	Total all ages.....	328	1,332	128	148	114	262	1,320	138	158	114	272	1,496	73	89	89	173	1,509	82	100	111

1 Number of noncarious teeth present at the time of the first examination, April 1942.
 2 Number of noncarious teeth that became carious during the year ended May 1943.
 3 Number of surfaces attacked by caries in new carious teeth.
 4 Number of new carious surfaces in teeth that had one or more carious surfaces at the time of the first examination.
 5 The sum of the items in 3 and 4.

that in the upper jaw there are 10 more new carious teeth in the right than in the left quadrant, and in the lower jaw there are 9 more in the right than in the left quadrant. The left quadrants had 8.6 percent less new carious teeth than the right quadrants. This digression from bilateral symmetry in the occurrence of dental caries suggests the possibility of a slight systematic error. However, the difference is not statistically significant. Furthermore, a comparison of the number of new carious teeth in the upper left quadrant with the number in the upper right quadrant, for each of the nine age groups, results in the finding that 4 are less, 3 are greater, and 2 are equal. When similar comparison is made between the findings in the lower left and lower right quadrants, the results are 4 less, 1 greater, and 4 equal. This ordering of the differences by age indicates that the differences observed in the totals were due to chance.

In order to facilitate a direct comparison of the new caries experience in the treated and control groups, a part of the data given in tables 2 and 4 is rearranged and presented in table 6, together with age specific percentage attack rates.

TABLE 6.—Number and percentage of previously noncarious permanent teeth attacked by caries during the year ended May 1943, by age, and left and right mouth quadrants, for the treated and control children

Age	Treated group						Control group					
	Left quadrants			Right quadrants			Left quadrants			Right quadrants		
	P teeth ¹	New DF teeth ²	Percent DF ³	P teeth ¹	New DF teeth ²	Percent DF ³	P teeth ¹	New DF teeth ²	Percent DF ³	P teeth ¹	New DF teeth ²	Percent DF ³
7.....	36	1	2.8	37	2	5.4	48	6	12.5	48	3	6.2
8.....	67	5	7.5	75	7	9.3	48	1	2.1	45	2	4.4
9.....	157	6	3.8	163	13	8.0	90	5	5.6	87	3	3.4
10.....	252	10	4.0	261	19	7.3	115	15	13.0	113	15	13.3
11.....	312	14	4.5	317	16	5.0	113	1	.9	117	5	4.3
12.....	469	16	3.4	459	35	7.6	431	31	7.2	429	34	7.9
13.....	429	23	5.4	442	42	9.5	625	55	8.8	627	59	9.4
14.....	435	21	4.8	430	30	7.0	592	57	6.4	907	72	7.9
15.....	88	4	4.5	88	2	2.3	466	30	6.4	456	27	5.9
Total.....	2,245	100	4.4	2,272	166	7.3	2,828	201	7.1	2,829	220	7.8
Average rate ⁴			4.5			6.8			7.0			7.0

¹ Noncarious (without caries or fillings) at time of first examination, April 1942.

² Noncarious teeth¹ attacked by caries during the year ended May 1943.

³ Percent of noncarious teeth¹ attacked by caries during year ended May 1, 1943.

⁴ Numerical average of the nine age specific rates.

This arrangement of the data (table 6) makes available another type of comparison between the new caries experience in the treated and untreated mouth quadrants of the treated group. However, the specific purpose in presenting this arrangement is to afford direct comparisons between the caries experience in the right or untreated quadrant of the treated group and that in the same quadrants of the control group. Since the age distribution of the children in the treated and control groups is dissimilar, an additional summary figure

is presented, the average rate. This figure is merely the numerical average of the age specific rates, and thus gives equal weight to each of the nine age specific rates.

It will be noted (table 6) that the average rate for the percentage of teeth attacked by caries is 6.8 for the right or untreated quadrants of the treated group and 7.0 for the right quadrants of the control group. Further evidence of marked similarity in the new caries experience in the right quadrants of the treated and untreated groups is obtained from comparison of the age specific percentage attack rates. Although there is considerable variation in these age specific rates, the differences are equally divided, 4 being higher and 5 being lower in the treated than in the control group. Inasmuch as dental caries normally occurs in bilaterally equal distribution, it is not necessary to limit the comparison to the right quadrant of the control group. The result obtained when the average rate for the right quadrants of the treated group is compared with the average rate for the left quadrant of the control group is again 6.8 and 7.0.

The striking similarity in the new caries experience in the right or untreated mouth quadrants of the treated group and that in the right (or left) quadrants in the control group indicates that the effect of topical applications of fluoride is exclusively local during the first year after application. This is evidence that the teeth in the treated and the teeth in the untreated mouth quadrants of the treated group actually retain the intended relationship of experimental and control for the period of experience presented in this report.

DISCUSSION

The results of this analysis demonstrate that topical application of a 2-percent sodium fluoride solution to the teeth under the conditions of this investigation was effective in reducing the incidence of dental caries by roughly 40 percent. However, the evidence applies only to that effect produced during the first year following the applications and to a group of children with an average incidence of approximately one DMF permanent tooth per year. The duration of the effect is not yet known.

Apparently the treatment is not effective in preventing caries attack on the noncarious surfaces of teeth previously attacked. If this finding is substantiated by continued studies, it has important implications which may assist in determining the physical or chemical action of fluorides on enamel. Further, it would indicate that the effectiveness of the treatment is largely limited to the prevention of caries and that it is not effective in controlling active dental caries. Therefore, the validity of this finding will also be an important factor in establishing the procedures to be employed in conducting a program of topical applications of fluoride to the teeth.

Since the criterion for diagnosing arrested caries is highly subjective, in the judgment of the examiner there was no evidence that the treatment effected an arrest of the active caries. However, this opinion is in accord with the findings on new carious surfaces in teeth previously attacked by caries. The question of whether or not the treatment arrests active caries is important to the interpretation of these findings. If arrest is effected, then these findings probably represent the true difference in caries experience in the treated and untreated teeth. On the other hand, if arrest is not effected, then these findings represent a conservative estimate of the difference. This is true because undoubtedly some of the new caries in the treated teeth was initiated prior to treatment but was not detected during the first examination.

As stated previously, it was not the intent of this study to determine the minimum number of treatments necessary to obtain the full effectiveness of the fluorides. However, the findings do indicate that 15 treatments were not more effective than 8 treatments. It is possible that one thorough treatment would be fully as effective as multiple treatments, but the answer to this question remains to be determined by future studies.

Although a 2-percent solution of sodium fluoride was used in this study, the most effective concentration of this solution or of other fluorides is not known. A 2-percent solution of sodium fluoride is highly toxic and must be used and guarded with extreme caution. Certainly the optimum concentration of the fluoride solution would be the minimum effective concentration.

SUMMARY

Data on the incidence of dental caries in the permanent teeth of 289 treated children and 326 control children for the year ended May 1943 have been presented and analyzed. During the first 8-week period of the observation the children in the treated group received 7 to 15 topical applications of sodium fluoride solution to the teeth in the left quadrants of the mouth.

Analysis of the data indicate that during the year of these observations:

1. Approximately 40 percent less new carious teeth occurred in the treated than in the untreated teeth of the treated group of children.
2. The relative reduction in the incidence of dental caries in treated teeth was appreciably greater in the upper than in the lower teeth.
3. There was no significant difference between the number of new carious tooth surfaces in treated and untreated teeth which had been previously attacked by caries. This finding indicates that the treatment was not effective in inhibiting renewed attacks by caries on teeth already attacked.

4. The incidence of dental caries in teeth in the untreated mouth quadrants of the treated group was similar to that in teeth in the comparable mouth quadrants of the control group. This finding indicates that for the first year following treatment the caries inhibiting effect is local and limited to those teeth to which the fluoride is topically applied.

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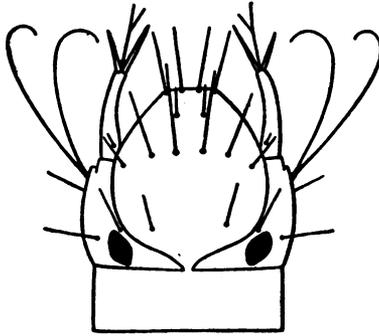
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THE IDENTIFICATION OF FIRST STAGE LARVAE OF PUERTO RICAN ANOPHELES

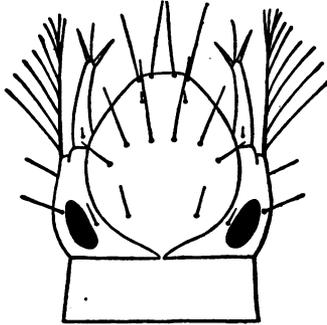
By HARRY D. PRATT, *Assistant Sanitarian (R), United States Public Health Service, San Juan, P. R.*

The keys to *Anopheles* larvae are based primarily on characters most prominent in fourth stage larvae. Since many of these, such as a well developed palmate hair, are not present in first stage larvae,

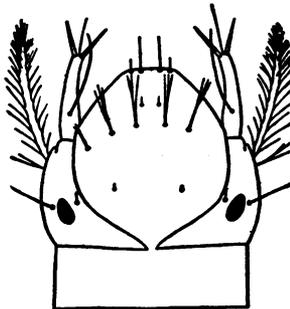
other characters must be used to distinguish them. A study of material reared from eggs and collected in the field has shown that good characters do exist to distinguish first instar larvae from later instar larvae and also for separating first stage larvae of the three Puerto



1 *A. albimanus*



2 *A. grabhamii*



3 *A. vestitipennis*

FIGURE 1.

Rican *Anopheles*. Most of the gravid females which laid eggs were collected within 5 miles of San Juan, P. R.

Martini (4), Hurlbut (1, 2), and Marshall (3) have shown that the first stage anopheline larvae can be distinguished from later instar

larvae by a number of characters. Among those discussed by these writers, the following have been found to be reliable for Puerto Rican species.

First instar larva

2 strong lateral hairs on third abdominal segment.
Single, spindle-shaped, or "lanceolate" hair on abdominal segments 3 to 7.
No ventral brush on anal segment.
Comb and pecten present and separate on terminal abdominal segments.

Later instar larva

1 strong lateral hair on third abdominal segment.
Palmate hair composed of leaflets on abdominal segments 3 to 7.
Ventral brush on anal segment.
Comb absent; pecten connected to respiratory apparatus.

Considerable variation exists in the spacing and branching of the head hairs in first stage larvae. The most constant characters for separating the first stage larvae of the three Puerto Rican species of *Anopheles* are given in the following key:

1. Subantennal hair simply forked, two-branched from the base; antennal hair short, never reaching to tip of antennal shaft; frontal head hairs single

Anopheles (Nyssorhynchus) albimanus Wiedemann.

Subantennal hair pinnately branched on one or both sides of a central shaft.----- 2

2. Subantennal hair with branches on only one side of a slender central shaft; antennal hair short, never reaching to tip of antennal shaft; frontal head hairs single

Anopheles (Anopheles) grabhamii Theobald.

Subantennal hair with branches on both sides of a stout central shaft; antennal hair long, reaching to or beyond tip of antennal shaft; frontal head hairs 2- to 6-branched

Anopheles (Anopheles) vestitipennis Dyar and Knab.

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COURT DECISION ON PUBLIC HEALTH

Garbage — dumping — construction of statute concerning. — (Texas Court of Civil Appeals; *Bright et al. v. City of Corpus Christi et al.*, 172 S.W.2d 763; decided June 9, 1943.) A suit was instituted by a number of citizens against the city of Corpus Christi and a construction company to enjoin the construction of a garbage disposal plant on a site adjoining, and in close proximity to, the residences and properties of the plaintiffs. At the close of the plaintiffs' case the trial court instructed a verdict in favor of the defendants and entered judgment accordingly. On appeal to the Court of Civil Appeals of Texas one of the contentions of the plaintiffs was that the instructed verdict was improper because the operation of the garbage disposal plant would necessarily involve the dumping of garbage within 300 yards of a public highway, an act which was prohibited by the State penal code. The disposal plant's site was within 300 yards of a public highway and the garbage, when brought to the plant, was to be dumped into a vat, picked up by a grab basket, elevated to the third floor, and cast into the incinerator and destroyed by fire. The view of the appellate court was that it was not the legislature's intention to prohibit the dumping of garbage at a disposal plant but that it was the intention to prevent the dumping or placing of trash, refuse, debris, garbage, and carcasses of dead animals near public roads and highways with no provision for destroying same. "The legislature never intended to prevent the dumping of garbage into a vat at an incinerator for immediate destruction."

The judgment of the lower court was affirmed.

DEATHS DURING WEEK ENDED NOVEMBER 6, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 6, 1943	Correspond- ing week, 1942
Data for 89 large cities of the United States:		
Total deaths.....	8,611	8,395
Average for 3 prior years.....	8,192	8,192
Total deaths, first 44 weeks of year.....	396,734	368,055
Deaths under 1 year of age.....	609	611
Average for 3 prior years.....	571	571
Deaths under 1 year of age, first 44 weeks of year.....	28,445	25,428
Data from industrial insurance companies:		
Policies in force.....	66,017,204	65,224,094
Number of death claims.....	10,477	9,525
Death claims per 1,000 policies in force, annual rate.....	8.3	7.6
Death claims per 1,000 policies, first 44 weeks of year, annual rate.....	9.7	9.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 13, 1943

Summary

An increase was recorded for the week in the incidence of meningococcus meningitis. A total of 223 cases was reported, as compared with 193 for the preceding week and a 5-year (1938-42) median of 33. A total of 15,796 cases has been reported to date this year, as compared with 3,039 for the same period last year and a corresponding 5-year median of 1,768. Cases reported since the beginning of the fourth quarter of the current year, the approximate date of the lowest incidence, aggregate 1,269, as compared with 368 for the same period last year and a corresponding 5-year median of 205.

States reporting more than 6 cases currently are as follows (last week's figures in parentheses): *Increases*—New Jersey 14 (8), Pennsylvania 21 (14), Ohio 12 (9), Michigan 17 (5), Missouri 11 (1), Virginia 11 (4), and California 11 (7); *decreases*—New York 33 (42), and Illinois 8 (14).

For the country as a whole, a decrease in the incidence of poliomyelitis was recorded. A total of 243 cases was reported, as compared with 259 for the preceding week and a 5-year median of 178. The total number of cases reported to date this year is 11,622, as compared with 3,733 for the same period last year and a 5-year median of 6,630. States reporting 10 or more cases currently (last week's figures in parentheses) are as follows: Massachusetts 10 (8), New York 17 (16), Indiana 26 (23), Kansas 11 (8), Oklahoma 14 (12), Oregon 19 (18), and California 62 (59).

Current reports of other important communicable diseases are as follows (figures for the corresponding week last year in parentheses): Anthrax 2 (0), diphtheria 398 (551), dysentery (all forms) 593 (283), infectious encephalitis 13 (12), influenza 1,555 (1,596), leprosy 1 (0), measles 3,688 (2,003), Rocky Mountain spotted fever 1 (1), scarlet fever 2,609 (2,518), smallpox 8 (9), tularemia 2 (10), typhoid and paratyphoid fever 80 (98), typhus fever 104 (87), and whooping cough 2,367 (2,998).

Deaths recorded in 90 large cities of the United States for the week totaled 8,540, as compared with 8,670 for the preceding week and a 3-year (1940-42) average of 8,377. The cumulative total for the year to date is 407,248, as compared with 378,437 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended November 13, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med-ian, 1938-42	Week ended—		Med-ian, 1938-42	Week ended—		Med-ian, 1938-42	Week ended—		Med-ian, 1938-42
	Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942	
NEW ENGLAND												
Maine.....	0	1	1	5	3	57	2	21	0	4	0	
New Hampshire.....	0	0	0	1		12	43	1	1	0	0	
Vermont.....	0	0	0			0	98	3	0	0	0	
Massachusetts.....	6	2	2			166	220	115	6	1	1	
Rhode Island.....	0	4	0	1		54	1	1	4	2	0	
Connecticut.....	0	0	0	1	9	3	63	23	5	4	0	
MIDDLE ATLANTIC												
New York.....	16	24	15	13	17	240	127	137	33	17	4	
New Jersey.....	4	3	5	2	4	188	26	18	14	2	2	
Pennsylvania.....	1	15	15	2	3	169	207	207	21	8	2	
EAST NORTH CENTRAL												
Ohio.....	7	24	24	4	5	495	27	27	12	0	0	
Indiana.....	7	6	18	45	6	106	29	7	3	1	1	
Illinois.....	11	24	25	9	9	36	27	27	8	2	0	
Michigan ¹	5	8	11	87	1	352	93	93	17	2	1	
Wisconsin.....	6	1	1	18	29	404	56	60	1	0	0	
WEST NORTH CENTRAL												
Minnesota.....	10	20	1	1	1	420	5	31	2	0	0	
Iowa.....	3	3	6	2	1	3	43	20	0	0	0	
Missouri.....	6	4	10	3	2	3	5	8	11	0	0	
North Dakota.....	4	1	3	14	4	210	1	6	0	0	0	
South Dakota.....	3	1	2		1	11	8	4	0	1	0	
Nebraska.....	4	4	2	5	5	5	49	2	0	0	0	
Kansas.....	2	5	2		5	3	9	9	0	0	0	
SOUTH ATLANTIC												
Delaware.....	0	0	0			17	0	1	3	0	0	
Maryland ¹	7	11	11	1	3	23	9	9	5	4	0	
District of Columbia.....	0	0	2	2	2	11	3	1	2	0	0	
Virginia.....	11	28	36	107	308	114	208	7	7	11	3	
West Virginia.....	6	14	14	17	12	16	2	8	2	0	1	
North Carolina.....	21	59	89	2	1	42	1	53	6	0	0	
South Carolina.....	12	40	23	305	293	229	52	2	9	4	3	
Georgia.....	26	24	32	19	14	36	23	4	5	3	0	
Florida.....	12	5	5	11	1	5	1	4	4	0	0	
EAST SOUTH CENTRAL												
Kentucky.....	9	10	18	3	3	4	13	4	12	6	1	
Tennessee.....	13	18	18	15	22	25	12	29	8	5	2	
Alabama.....	26	28	28	52	27	49	23	2	8	1	1	
Mississippi ²	5	10	16						3	0	1	
WEST SOUTH CENTRAL												
Arkansas.....	6	15	15	26	35	35	4	12	5	0	0	
Louisiana.....	7	12	12	11	3	3	1	1	1	1	1	
Oklahoma.....	5	10	12	38	65	35	12	1	4	0	0	
Texas.....	62	56	57	630	523	220	27	21	29	5	1	
MOUNTAIN												
Montana.....	2	0	0	1	1	3	78	4	8	0	0	
Idaho.....	2	0	0			5	12	5	1	0	0	
Wyoming.....	0	1	1	2	39	7	7	3	0	0	0	
Colorado.....	17	16	16	15	37	28	52	3	13	2	0	
New Mexico.....	0	1	2	1	1	0	0	5	0	0	0	
Arizona.....	3	2	2	116	22	55	1	2	5	1	0	
Utah ²	0	2	1	1	3	1	264	23	0	0	0	
Nevada.....	0	0	0	3	1		4	3	0	0	0	
PACIFIC												
Washington.....	23	3	1	1	1	45	312	21	4	2	0	
Oregon.....	2	1	4	6	7	7	34	117	11	1	0	
California.....	26	35	23	12	44	28	35	41	111	11	4	
Total.....	398	551	641	1,555	1,596	1,115	3,698	2,003	1,792	223	69	
45 weeks.....	11,513	12,959	13,301	94,209	92,868	159,002	657,876	478,165	478,165	16,796	3,039	

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 13, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever ¹		
	Week ended—		Median, 1938-42	Week ended—		Median, 1938-42	Week ended—		Median, 1938-42	Week ended—		Median, 1938-42
	Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942		Nov. 13, 1943	Nov. 14, 1942	
NEW ENGLAND												
Maine.....	0	1	1	15	8	8	0	0	0	0	1	1
New Hampshire.....	0	1	0	1	15	9	0	0	0	0	0	0
Vermont.....	0	0	0	14	9	5	0	0	0	1	0	0
Massachusetts.....	10	0	1	142	197	95	0	0	0	1	1	1
Rhode Island.....	2	0	0	8	21	7	0	0	0	1	1	0
Connecticut.....	1	1	0	23	44	22	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York.....	17	7	7	239	224	173	0	0	0	7	7	7
New Jersey.....	1	9	5	62	71	65	0	0	0	1	1	1
Pennsylvania.....	1	0	6	153	152	152	0	0	0	5	5	9
EAST NORTH CENTRAL												
Ohio.....	2	4	5	223	181	205	0	0	0	2	6	6
Indiana.....	1	5	2	53	57	104	1	0	1	0	0	3
Illinois.....	26	11	11	107	170	213	1	1	1	3	3	6
Michigan ¹	4	2	6	105	63	140	1	0	1	2	3	2
Wisconsin.....	7	2	5	116	133	116	2	1	2	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	1	2	8	64	54	63	0	0	0	0	4	0
Iowa.....	1	2	2	54	41	50	0	0	1	4	2	1
Missouri.....	3	1	1	48	55	55	0	0	0	2	2	4
North Dakota.....	5	0	0	8	13	13	0	0	0	0	0	0
South Dakota.....	0	3	3	12	18	28	0	0	0	0	1	1
Nebraska.....	3	7	0	32	15	11	0	0	1	0	0	0
Kansas.....	11	1	1	94	37	71	2	0	0	0	1	3
SOUTH ATLANTIC												
Delaware.....	0	0	0	2	19	6	0	0	0	0	0	0
Maryland ¹	0	0	0	40	53	35	0	0	0	0	11	4
District of Columbia.....	0	0	0	15	19	13	0	0	0	1	0	0
Virginia.....	2	0	1	54	85	65	0	0	0	1	2	5
West Virginia.....	1	1	1	84	35	62	0	0	0	1	1	3
North Carolina.....	0	0	1	130	116	112	0	1	0	3	2	2
South Carolina.....	0	0	0	10	20	20	0	0	0	2	4	3
Georgia.....	1	1	1	31	42	32	0	0	0	1	4	3
Florida.....	0	2	1	12	10	4	0	0	0	0	3	2
EAST SOUTH CENTRAL												
Kentucky.....	6	1	5	44	57	72	0	1	0	3	6	7
Tennessee.....	0	0	0	55	97	62	0	0	0	3	6	6
Alabama.....	0	3	1	22	36	34	0	0	0	2	1	2
Mississippi ¹	2	0	2	4	21	12	0	0	0	1	0	2
WEST SOUTH CENTRAL												
Arkansas.....	3	2	1	8	13	11	0	1	1	8	1	7
Louisiana.....	0	0	0	14	10	11	0	0	1	4	6	8
Oklahoma.....	14	0	1	58	23	17	0	0	1	1	0	0
Texas.....	9	12	4	55	47	47	0	1	1	9	4	16
MOUNTAIN												
Montana.....	2	0	0	34	11	26	0	0	0	2	0	0
Idaho.....	0	0	2	11	1	11	0	0	0	1	0	1
Wyoming.....	0	0	0	1	6	6	0	0	0	0	0	0
Colorado.....	6	2	0	27	33	33	0	0	0	3	1	2
New Mexico.....	2	0	0	15	7	6	0	0	0	0	3	3
Arizona.....	0	4	0	10	1	1	0	0	0	1	1	1
Utah ¹	7	3	3	28	11	12	0	0	0	0	1	1
Nevada.....	3	1	0	3	1	0	0	0	0	0	0	0
PACIFIC												
Washington.....	8	1	1	58	35	35	1	3	1	0	0	3
Oregon.....	19	0	0	59	22	15	0	0	0	0	1	1
California.....	62	17	5	152	109	89	0	0	0	3	2	3
Total	243	109	178	2,609	2,518	2,518	8	9	18	80	98	154
45 weeks	11,622	3,733	6,630	118,943	107,925	135,828	663	698	2,132	4,990	6,209	8,735

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 13, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough			Week ended Nov. 13, 1943								
	Week ended—		Median, 1938-42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Nov. 13, 1943	Nov. 14, 1942			Amebic	Bacillary	Un-specified					
NEW ENGLAND												
Maine.....	6	62	44	0	0	0	0	0	0	0	0	0
New Hampshire.....	3	3	1	0	0	0	0	0	0	0	0	0
Vermont.....	34	42	42	0	0	0	0	0	0	0	0	0
Massachusetts.....	41	207	172	0	0	4	0	0	0	0	0	0
Rhode Island.....	22	29	21	0	0	0	0	0	0	0	0	0
Connecticut.....	37	70	72	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	257	470	459	0	3	147	0	3	0	0	0	0
New Jersey.....	96	244	161	0	3	0	0	1	0	0	0	0
Pennsylvania.....	145	326	279	2	0	0	0	1	0	0	0	1
EAST NORTH CENTRAL												
Ohio.....	153	124	191	0	0	1	0	1	0	0	0	0
Indiana.....	11	22	13	0	0	0	0	0	0	0	2	0
Illinois.....	122	152	161	0	1	4	0	1	0	0	0	0
Michigan ¹	180	232	232	0	0	1	0	0	0	0	0	0
Wisconsin.....	191	143	195	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	54	40	45	0	1	0	0	0	0	0	0	0
Iowa.....	24	18	22	0	0	0	0	0	0	0	0	0
Missouri.....	12	5	11	0	0	0	0	0	0	0	0	0
North Dakota.....	20	7	7	0	0	0	0	0	0	0	0	0
South Dakota.....	27	0	6	0	0	0	0	0	0	0	0	0
Nebraska.....	8	11	7	0	0	0	0	1	0	0	0	0
Kansas.....	15	17	22	0	1	1	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	1	1	5	0	0	0	0	0	0	0	0	0
Maryland.....	51	87	52	0	0	0	4	0	0	0	0	0
Dis. of Col.....	15	12	12	0	1	0	0	0	0	0	0	0
Virginia.....	80	50	50	0	0	0	133	0	0	0	0	0
West Virginia.....	18	7	23	0	0	0	0	0	0	0	0	0
North Carolina.....	190	41	113	0	0	0	0	0	0	0	0	4
South Carolina.....	47	20	20	0	0	14	0	0	0	0	0	2
Georgia.....	5	19	9	0	0	3	0	0	0	0	0	27
Florida.....	0	16	10	0	10	1	0	1	0	0	0	7
EAST SOUTH CENTRAL												
Kentucky.....	88	19	59	0	0	0	0	0	0	0	0	0
Tennessee.....	11	27	27	0	0	0	1	0	0	0	0	2
Alabama.....	17	9	9	0	0	0	0	0	0	0	0	18
Mississippi ²				0	0	0	0	0	0	0	0	5
WEST SOUTH CENTRAL												
Arkansas.....	13	44	16	0	1	12	0	0	0	0	0	1
Louisiana.....	6	4	6	0	5	6	0	0	0	0	0	13
Oklahoma.....	0	4	4	0	0	0	0	0	0	0	0	0
Texas.....	81	85	85	0	15	185	0	0	0	0	0	23
MOUNTAIN												
Montana.....	0	11	11	0	0	0	0	0	0	0	0	0
Idaho.....	5	0	4	0	0	0	0	0	0	0	0	0
Wyoming.....	2	3	4	0	0	0	0	0	0	0	0	0
Colorado.....	36	5	17	0	0	0	0	0	0	0	0	0
New Mexico.....	4	8	8	0	0	5	1	0	0	0	0	0
Arizona.....	18	9	9	0	1	0	15	2	0	0	0	0
Utah ³	26	7	27	0	0	0	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	83	21	31	0	0	0	0	0	0	0	0	0
Oregon.....	18	8	12	0	0	0	0	0	0	1	0	0
California.....	96	257	142	0	6	7	0	2	1	0	0	1
Total.....	2,387	2,998	3,242	2	48	391	154	13	1	1	2	104
45 weeks.....	161,574	155,529	155,529	60	1,856	14,628	3,900	610	25	430	701	3,820
45 weeks, 1942.....				71	1,042	11,194	6,077	512	42	450	760	3,201

¹ New York City only.

² Period ended earlier than Saturday.

³ Including paratyphoid fever cases reported separately as follows: Massachusetts, 1; New York, 1; Michigan, 1; Georgia, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 30, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Erysipelas, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polio-myelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0		0	2	1	2	0	8	0	0	3
New Hampshire:												
Concord.....	0	0		1	0	0	1	0	0	0	0	0
Vermont:												
Barre.....	0	0		0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston.....	3	0		1	4	5	10	4	25	0	0	18
Fall River.....	0	0		0	1	0	0	0	0	0	0	4
Springfield.....	0	0		0	3	0	0	0	1	0	0	17
Worcester.....	0	0		0	0	3	4	0	18	0	1	9
Rhode Island:												
Providence.....	0	0		0	24	3	0	3	0	0	0	13
Connecticut:												
Bridgeport.....	0	0	1	1	0	1	2	1	4	0	0	0
Hartford.....	0	0		0	0	0	0	1	1	0	0	1
New Haven.....	0	0		0	0	0	1	0	3	0	0	6
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0		0	3	5	5	0	3	0	0	14
New York.....	5	1	5	2	108	18	69	15	86	0	4	62
Rochester.....	0	0		0	2	2	8	1	5	0	0	12
Syracuse.....	0	0		0	0	1	1	2	1	0	0	19
New Jersey:												
Camden.....	1	0		1	0	0	2	0	2	0	0	1
Newark.....	0	0		0	2	2	2	1	7	0	0	11
Trenton.....	0	0		0	0	0	3	1	1	0	0	1
Pennsylvania:												
Philadelphia.....	2	0	1	1	3	7	25	2	32	0	0	35
Pittsburgh.....	6	0	3	1	45	5	18	0	19	0	0	16
Reading.....	0	0		0	0	1	0	0	2	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	4	0		0	23	0	1	1	22	0	0	7
Cleveland.....	1	0	6	1	4	0	7	0	41	0	0	11
Columbus.....	0	0		0	10	1	0	0	13	0	0	6
Indiana:												
Indianapolis.....	2	0		0	1	0	11	0	14	0	0	10
South Bend.....	0	0		0	0	2	0	0	2	0	0	0
Terre Haute.....	0	0		0	0	0	0	0	0	0	0	0
Illinois:												
Chicago.....	4	0		0	4	6	21	20	26	0	1	66
Springfield.....	0	0		0	2	0	1	0	7	0	0	0
Michigan:												
Detroit.....	4	0		2	5	6	14	1	34	0	1	29
Flint.....	0	0		0	2	0	0	0	0	0	0	4
Grand Rapids.....	0	0		0	0	0	2	0	6	0	0	0
Wisconsin:												
Kenosha.....	0	0		0	0	0	0	0	3	0	0	0
Milwaukee.....	0	0		0	2	2	6	0	26	0	0	51
Racine.....	0	0		0	3	0	0	0	5	0	0	12
Superior.....	0	0		0	131	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0		0	5	0	3	0	4	0	0	17
Minneapolis.....	6	0		0	45	0	1	4	18	0	0	4
St. Paul.....	1	0		0	28	1	3	2	7	0	0	24
Missouri:												
Kansas City.....	1	0		0	3	1	5	0	7	0	0	2
St. Joseph.....	0	0		0	0	1	0	0	1	0	0	0
St. Louis.....	0	0	6	0	1	2	9	0	5	0	0	8

City reports for week ended October 30, 1943—Continued

	Diphtheria cases	Enecephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pellomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	-----	0	6	0	0	0	4	0	0	4
Nebraska:												
Omaha.....	5	0	-----	0	0	0	4	0	5	0	0	0
Kansas:												
Topeka.....	0	0	-----	0	0	0	0	0	1	0	0	2
Wichita.....	0	0	-----	0	0	1	3	0	0	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	1	0	3	2	1	0	1	0	1	0
Maryland:												
Baltimore.....	3	0	2	2	2	6	15	0	10	0	0	23
Cumberland.....	0	0	-----	0	0	0	0	0	0	0	0	0
Frederick.....	0	0	-----	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington.....	0	0	-----	0	5	7	6	2	18	0	0	10
Virginia:												
Lynchburg.....	0	0	-----	0	64	0	1	0	1	0	0	25
Richmond.....	0	0	1	0	3	4	2	1	3	0	0	0
Roanoke.....	0	0	-----	0	0	0	0	0	0	0	0	1
West Virginia:												
Charleston.....	0	0	-----	0	1	0	0	0	2	0	0	0
Wheeling.....	0	0	-----	0	0	0	1	0	0	0	0	0
North Carolina:												
Winston-Salem.....	2	0	-----	0	0	0	0	0	4	0	0	0
South Carolina:												
Charleston.....	0	0	28	0	3	1	1	0	1	0	0	0
Georgia:												
Atlanta.....	1	0	4	1	1	1	4	0	7	0	0	0
Brunswick.....	0	0	-----	0	7	0	0	0	1	0	0	0
Savannah.....	0	0	-----	0	0	0	2	0	1	0	0	0
Florida:												
Tampa.....	0	0	-----	0	0	0	2	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	-----	0	0	1	1	0	2	0	1	2
Nashville.....	0	0	-----	0	0	0	3	0	1	0	0	6
Alabama:												
Birmingham.....	0	0	4	0	2	0	3	0	2	0	0	0
Mobile.....	0	0	2	0	0	0	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	0	0	1	0	0	0	0	0
Louisiana:												
New Orleans.....	2	0	2	1	1	3	8	0	5	0	0	0
Shreveport.....	0	0	-----	0	0	0	2	0	0	0	1	0
Texas:												
Dallas.....	0	0	-----	0	0	0	2	1	3	0	0	2
Galveston.....	1	0	-----	0	0	0	0	0	0	0	0	0
Houston.....	2	0	-----	0	0	1	3	1	0	0	2	0
San Antonio.....	1	0	-----	1	0	0	5	2	1	0	0	0
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	0	0	0	0	0	0	0	0
Great Falls.....	0	0	-----	0	7	0	0	0	11	0	0	5
Helena.....	0	0	-----	0	0	0	0	0	0	0	0	0
Missoula.....	0	0	-----	0	0	0	1	0	0	0	0	0
Idaho:												
Boise.....	0	0	-----	0	0	0	0	0	0	0	0	0
Colorado:												
Denver.....	5	0	6	0	2	3	8	0	4	0	0	27
Pueblo.....	0	0	-----	0	4	0	0	1	1	0	0	1
Utah:												
Salt Lake City.....	0	0	-----	0	1	0	1	7			0	3

City reports for week ended October 30, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	3	5	0	3	2	4	0	0	0	19
Spokane.....	0	0	0	3	0	0	2	9	0	0	0	0
Tacoma.....	1	0	0	1	0	1	4	3	0	0	0	3
California:												
Los Angeles.....	4	0	3	0	3	0	7	7	15	0	0	6
Sacramento.....	0	1	0	0	0	0	1	2	1	0	0	5
San Francisco.....	1	0	1	1	4	1	10	8	11	0	0	7
Total.....	69	2	76	20	606	105	343	99	596	0	12	645
Corresponding week, 1942.....	121	3	85	26	377	85	345	36	624	1	34	997
Average, 1938-42.....	109	.....	74	17	369	.....	301	.....	587	1	30	1,069

1 3-year average, 1940-42.

2 5-year median.

Anthrax.—Cases: Philadelphia, 1.*Dysentery, amebic*.—Cases: Boston, 3; Philadelphia, 1; St. Louis, 1; Los Angeles, 1.*Dysentery, bacillary*.—Cases: Buffalo, 19; New York, 9; Syracuse, 1; Philadelphia, 2; Chicago, 1; St. Louis, 1; Charleston, S. C., 2; Atlanta, 1; Nashville, 2; Los Angeles, 3.*Dysentery, unspecified*.—Cases: Richmond, 1; San Antonio, 2.*Tularemia*.—Cases: New Orleans, 1.*Typhus fever*.—Cases: Charleston, S. C., 1; Atlanta, 1; Brunswick, 1; Savannah, 3; Birmingham, 2; New Orleans, 3; Shreveport, 1; Houston, 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,554,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	7.5	0.0	2.5	7.5	84.5	32.3	49.7	22.4	149.1	0.0	2.5	176
Middle Atlantic.....	6.2	0.4	4.0	2.2	72.7	18.3	53.3	9.5	70.5	0.0	1.3	77
East North Central.....	8.9	0.0	3.6	1.8	111.9	8.9	37.3	13.0	117.2	0.0	1.2	116
West North Central.....	25.4	0.0	11.7	0.0	172.0	11.7	54.7	11.7	101.6	0.0	0.0	119
South Atlantic.....	10.4	0.0	62.5	5.2	154.4	36.4	60.7	5.2	85.0	0.0	1.7	102
East South Central.....	5.9	0.0	35.6	0.0	11.9	5.9	53.5	0.0	29.7	0.0	5.9	43
West South Central.....	17.6	0.0	5.9	5.9	2.9	11.7	67.5	11.7	26.4	0.0	5.9	6
Mountain.....	40.2	0.0	48.2	0.0	112.6	24.1	80.4	64.3	168.3	0.0	0.0	289
Pacific.....	10.5	1.7	7.0	7.0	45.4	1.7	38.4	43.7	75.2	0.0	0.0	70
Total.....	10.4	0.3	11.5	3.0	91.4	15.8	51.8	14.9	89.9	0.0	1.8	97

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—According to information received, a total of 927 cases of dengue fever has been reported up to November 8, 1943, in Honolulu, T. H.

Plague (rodent).—A rat found on October 13, 1943, in Makawao area, Island of Maui, T. H., has been proved positive for plague.

Panama Canal Zone

Notifiable diseases—September 1943.—During the month of September 1943 certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	4		2		6		7		19	
Diphtheria.....	13		6		1		2		22	
Dysentery (amebic).....	1		1		1		8		11	
Dysentery (bacillary).....	1						3	1	4	1
Leprosy.....	1								1	
Malaria ¹	9		4		123		49	6	185	6
Measles.....			1		2				3	
Mumps.....	20		31		93		6		150	
Paratyphoid fever.....	1						1		2	
Pneumonia.....		12		1	21			1	21	14
Relapsing fever.....					1		1		2	
Tuberculosis.....		18		5	4	2		8	4	33
Typhoid fever.....							2	1	2	1
Whooping cough.....		1								1

¹ 52 recurrent cases.

² Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 16, 1943.—During the week ended October 16, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		4	1	129	135	26	21	15	94	425
Diphtheria		10	12	60		1		1		84
Dysentery (bacillary)				2			1		5	8
German measles		1		10	9				2	22
Influenza					30	2			40	72
Measles		4	1	134	101	18	5	3	51	317
Meningitis, meningococcus				2	4	2	1		2	11
Mumps		3		39	99	21	7	7	28	204
Pollomyelitis		1	1	3	2	1				10
Scarlet fever		1	12	118	74	26	21	21	42	315
Tuberculosis (all forms)		12	5	85	45	17	26		31	221
Typhoid and paratyphoid fever		1		11	2	1			1	16
Undulant fever					2					2
Whooping cough		10		112	153	17		31	13	336

JAMAICA

Notifiable diseases—4 weeks ended October 23, 1943.—During the 4 weeks ended October 23, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox		9	Leprosy		3
Diphtheria	3	2	Tuberculosis	34	88
Dysentery		4	Typhoid fever		66
Erysipelas	1	1	Typhus fever	3	1

NORWAY

Trondheim—Diphtheria.—According to information dated November 3, 1943, an epidemic of diphtheria is spreading in Trondheim, Norway, where it is said that 105 new cases were reported in October 1943.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Belgian Congo—Butakonda Lubero.—During the period October 15–19, 1943, 7 deaths from suspected pneumonic plague were reported at Butakonda Lubero, Belgian Congo. All necessary protective measures including strict quarantine of the affected region have been taken.

Morocco (French).—During the month of September 1943, 2 cases of plague were reported in Casablanca region and 1 case was reported in Marrakech region, French Morocco.

Smallpox

Algeria.—For the period September 21–30, 1943, 29 cases of smallpox were reported in Algeria.

Morocco (French).—During the month of September 1943, 34 cases of smallpox were reported in French Morocco.

Typhus Fever

Algeria.—For the period September 21–30, 1943, 14 cases of typhus fever were reported in Algeria.

Hungary.—During the week ended October 16, 1943, 21 cases of typhus fever were reported in Hungary.

Morocco (French).—During the month of September 1943, 63 cases of typhus fever were reported in French Morocco.

Rumania.—For the period October 24–31, 1943, 46 cases of typhus fever were reported in Rumania (including 2 cases in Bucharest).

Slovakia.—For the week ended October 16, 1943, 6 cases of typhus fever were reported in Slovakia.

Tunisia.—Typhus fever has been reported in Tunisia as follows: July 21–31, 1943, 64 cases; for the month of August 1943, 92 cases; for the month of September 1943, 26 cases.

Yellow Fever

French Guinea.—Deaths from suspected yellow fever have been reported in French Guinea as follows: October 29, 1943, 1 death at Baccoro; October 30, 1943, 1 death at Conakry.

Senegal—Tambacounda.—On October 28, 1943, 1 death from yellow fever was reported at Tambacounda, Senegal.